

REMARKS

Claims 1 and 3-7 have been amended. Claims 2 and 12-20 have been cancelled. New claims 21-30 have been added. Claims 1, 3-12 and 21-30 remains pending in this application.

The objections and rejections noted in the Office Action are addressed below.

Priority

The Examiner noted that Applicant has not complied with the priority requirement for claim 2. Applicant respectfully disagrees. The present invention claims the benefits of priorities of two provisional patent applications. The subject matter of claim 2 was fully disclosed in at least one of the priority applications.

Section 112 Rejections

The Examiner noted certain informalities in claims 2, 3, 4 and 6. Appropriate amendments have been made to correct such informalities.

Section 102 Rejections

- U.S. Patent No. 6,007,690 to Nelson

Claims 1, 3, 4, 6 and 8-10 have been rejected as being anticipated by Nelson. This rejection has been traversed.

Applicant amended independent claim 1 to require a section of curved serpent-like structure defining a reaction zone in the microfluidic channel. This is essentially the subject matter of claim 2, to which the Examiner did not apply Nelson. Nelson does not disclose a serpent-like flow structure. Further, by nature of an electrophoretic system, Nelson discloses a continuous flow system in which fluid continuously flow past a flow enrichment channel. To the extent that the flow enrichment channel may be deemed to be a reaction zone, it nonetheless does not teach terminating flow after the fluid has been transported to the reaction zone, to allow a portion of said fluid to react with the biological probe. Accordingly, claim 1 should be patentable over Nelson. The remaining dependent claims are likewise patentable.

- U.S. Patent No. 6,168,948 to Anderson

The Examiner rejected claims 1-5, 7, 9 and 11 as being anticipated by Anderson. This rejection is respectfully traversed.

Claim 1 as amended requires “immobilizing at least one biological probe in said reaction zone, to define a constant and consistent reaction volume independent of physical flow barriers in said microchannels to allow fluid to flow pass said reaction zone”. Anderson does not disclose this structure. Instead Anderson discloses a fluidic structure having a system of fluid passages and chambers that are regulated with valves, membrane, etc., flow barriers. The reaction chamber 1256 is does not allow for fluid to flow pass the reaction chamber. For example, at Col. 30, line 65+, it is specifically stated that: “Degassed sample may then be moved from the degassing chamber 1254, to, e.g., reaction chamber 1256, opening valves 1262 and 1264, and applying a positive pressure to the degassing chamber vent port 1271. The fluid is then forced from the degassing chamber 1254, through main channel 1252, into reaction

chamber 1256. When the fluid fills the reaction chamber, it will contact the hydrophobic membrane, thereby arresting fluid flow.” It is noted that a hydrophobic membrane is disclosed by Anderson to be a gas permeable fluid barriers, or a membrane that allows passage of dissolved or trapped gases, not fluid. (See, e.g., Col. 29, line 16; and line 65.)

Further, new claim 21 has been added to further require that “the step of transporting fluid to said reaction zone comprises transporting fluid to flow pass and beyond said reaction zone”. And new claim 22 further requires “the step of transporting fluid from said reaction zone after reaction has taken place, by flowing the fluid in said reaction zone pass and beyond said reaction zone in the same direction as flow of fluid into said reaction zone prior to reaction taking place.” This is clearly not the case in Anderson. In Anderson, as noted above, the fluid is arrested after filling the chamber 1256. A reverse flow must be implemented to remove the fluid from the chamber 1256.

For at least the foregoing reasons, claim 1, and all the claims dependent therefrom, are patentable over Anderson.

New Claim

New claims have been added to round out the coverage of the present invention. New independent claims 23 and 27 are patentable over Nelson and Anderson for at least the same reasons noted above. Neither Nelson nor Anderson teaches the combination of a method (or a device) for performing biological reaction in a microfluidic biochip platform, comprising the steps of (or structure for) providing at least one microfluidic channel, said microfluidic channel including a section comprising a curved serpent-like channel and an output channel coupled to exit of said curved serpent-like channel; immobilizing at least one biological probe in said

section of curved serpent-like channel; and transporting fluid in said microfluidic channel to said curved serpent-like channel, where a portion of said fluid reacts with said biological probe immobilized in the curved serpent-like channel, thereby to define a reaction zone having a constant and consistent reaction volume.

New dependent claims 24 and 25 further requires that the output channel is coupled to the curved serpent-like channel independent of flow barrier, and wherein the step of transporting fluid to said curved serpent-like channel comprises transporting fluid to flow pass and beyond said reaction zone and then terminating flow to allow reaction to take place, wherein fluid remaining in said reaction zone corresponds to said reaction volume; and fluid is transported from said reaction zone after reaction has taken place, by flowing the fluid in said reaction zone pass and beyond said reaction zone in the same direction as flow of fluid into said reaction zone prior to reaction taking place.

Applicant respectfully submits that all the new claims are patentable, for the reasons noted above.

CONCLUSION

In view of all the foregoing, Applicant submits that the claims pending in this application are patentable over the references of record and are in condition for allowance. Such action at an early date is earnestly solicited. **The Examiner is invited to call the undersigned representative to discuss any outstanding issues that may not have been adequately addressed in this response.**

Respectfully submitted,



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